R E P O R T R E S U M E S

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A STUDY OF THE EFFECTIVENESS OF THE STENOGRAPHIC LABORATORY IN TEACHING BEGINNING AND ADVANCED SHORTHAND.

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THE ACHIEVEMENT OF ALL BEGINNING AND ADVANCED SHORTHAND STUDENTS USING TRADITIONAL SHORTHAND TEACHING DURING 1964-65 WAS COMPARED WITH THAT OF ALL BEGINNING AND ADVANCED SHORTHAND STUDENTS USING THE FOUR-CHANNEL STENOGRAPHIC LABORATORIES AND A LOCALLY DEVELOPED 440-TAPE LIBRARY DURING 1965-66. IN BEGINNING SHORTHAND, 1,596 STUDENTS STARTED AND 1,148 COMPLETED THE COURSE. IN ADVANCED SHORTHAND, 505 STUDENTS STARTED AND 412 COMPLETED THE COURSE. THE STENOGRAPHIC LABORATORY METHOD OF TEACHING BEGINNING SHORTHAND RESULTED IN SIGNIFICANTLY BETTER ACHIEVEMENT THAN THE TEACHING OF SHORTHAND IN THE TRADITIONAL METHOD IN THAT MORE STUDENTS IN THE FORMER ATTAINED GREATER DICTATION SPEED, SPECIFIC SPEED GOALS EARLIER, AND ACCEPTABLE SPEED GOALS AND AN EMPLOYABLE SHORTHAND SKILL BY THE END OF THE YEAR. THE COMPARISON OF RESULTS ON 3- AND 5-MINUTE SHORTHAND SPEED TESTS FOR ADVANCED SHORTHAND SHOWED NO SIGNIFICANT DIFFERENCE IN IMPROVEMENT BETWEEN GROUPS TAUGHT BY THE TWO METHODS. THE USE OF THE STENOGRAPHIC LABORATORY AND TAPES HAS IMPLICATIONS FOR INSTRUCTION--(1) TEACHERS HAVE MORE TIME FOR TEACHING OTHER SECRETARIAL AND OFFICE DUTIES, (2) TEACHERS CAN DEVOTE MORE TIME TO INDIVIDUALIZED INSTRUCTION AND TO PLANNING, AND (3) STUDENTS CAN WORK INDIVIDUALLY ON SPEED BUILDING. (FS)

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A STUDY IN THE EFFECTIVENESS OF THE STENOGRAPHIC LABORATORY IN TEACHING BEGINNING AND ADVANCED SHORTHAND

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A C K N O W L E D G E M E N T S

The authors would like to take this opportunity to give recognition to several people from the Phoenix Union High School System who have assisted in the preparation of this report: the shorthand teachers who furnished the data from their schools, the administrators who supported the project, and special recognition to Dr. Fred Bedford, Director of Research Services, for his guidance and help in preparing the statistical portion of this paper.

A STUDY OF THE EFFECTIVENESS OF THE STENOGRAPHIC LABORATORY IN TEACHING BEGINNING AND ADVANCED SHORTHAND

Teachers in both Beginning and Advanced Shorthand have long realized that the speed of the dictation in class did not meet the needs of all of the students. It was usually based on the teacher's estimate of the average rate that the students could take the dictation. They realized that slow students had little chance to keep up and often missed a substantial portion of the practice while the students of higher ability were not challenged to take dictation at a rate near their capabilities. Because of this realization, the Phoenix Union High School System began installing 4-channel stenographic laboratories in two of their high schools. These installations were completed at North and South Mountain in the fall of 1964. In using this equipment at the two pilot schools, the teachers found that there were not enough commercially prepared shorthand tapes to make full and effective use of the equipment. Therefore, a proposal was made to develop a System-wide set of shorthand tapes. This proposal was accepted and the library of tapes was started in the spring of 1965 to be finished the following summer.[1]

The installation of stenographic laboratories was completed in the other eight schools in the fall of 1965. The 440-tape library,

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[1]This program was financed through a cooperative effort of the Phoenix Union High School System and the Arizona State Department of Vocational Education. A complete discussion of the development of the tape library may be found in Appendix A.

which was completed in the summer of 1965, was duplicated and distributed to all Phoenix High Schools in the fall of 1965.

This study was undertaken to help justify the time and monies expended in equipping System schools with the stenographic laboratories and the tape libraries to use in the laboratories.

BACKGROUND--RELATED STUDIES

The use of shorthand dictation laboratories is a recent innovation. Many articles have been written on its installation and use; however, very few studies have been made to test the results of this method of teaching shorthand. Two studies of the worth of the dictation laboratories in teaching shorthand were published in professional business education magazines during the last school year.

The Milwaukee Public High Schools ran two studies. The first, in 1963, was to determine if skills and knowledges that are generally attained in a two-year shorthand program can be acquired by accelerated, talented students in a one-year program. James Hodge, Coordinator of Business Education in the Milwaukee Public Schools, reported the following: "Results of these experiments would seem to indicate that it is possible, with the use of a shorthand laboratory, to develop salable stenographic skills on a one-year program with superior students."[2]

Following the 1963 study, Milwaukee Public Schools installed shorthand laboratories in two additional high schools. The study, after the second installation, was concerned with results in regular shorthand classes. The following statement is an excerpt from this study:

> It is interesting to note that the achievement of students in the experimental classes (using shorthand laboratories) surpassed that of the students in the control classes in every instance . . . This may be partly explained by the fact that the ability scores of the students enrolled in the experimental classes averaged slightly higher than the ability scores of the control classes. In the case of teacher A, however, the ability scores of the control class were slightly higher than

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[2]James Hodge, "Shorthand Labs Aid Teaching," "The Balance Sheet, XLVII (January, 1966), 206-207.

> those of the experimental class; yet the experimental class out performed the control class in dictation speed, although the ability to transcribe mailable letters did not equal that of the control group.[3]

Brendan G. Coleman in his doctorial dissertation compared college stenographic students at Michigan State University. He reports: "The results showed that the group taught in a traditional fashion performed significantly better than did their counterparts who were taught with a system involving the use of a multi-channel tape laboratory."[4]

Ted Stoddard, a doctorial graduate student at Arizona State University, is currently involved in a study of the use of shorthand laboratories at Brigham Young University. This study is based on a programmed learning situation.

The two high school studies included as background in this paper report positive outcomes. The college study reports negative outcomes. This difference could be explained by several different factors.

This study differs from the other studies because it is in essence testing not only the use of the four channel tape equipment for the teaching of shorthand, but the use of a 440-tape library used in conjunction with commercial tapes.

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[3] Ibid.

[4] Brendan G. Coleman, "The Effects of a Tape-Laboratory Instructional Approach Upon Achievement in Beginning Shorthand Classes," The Journal of Business Education, XL (October, 1965), 29

PROCEDURES

For this two-year study, a comparison is being made of the achievement of all beginning and advanced shorthand students in the Phoenix Union High School System during the 1964-65 school year using traditional shorthand teaching with the achievement of all beginning and advanced shorthand students during the 1965-66 school year using the stenographic laboratory and tape library.

Most of the teachers involved in teaching Beginning Shorthand during the 1964-65 school year were also teaching Beginning Shorthand during 1965-66. The factor adherent in the varying abilities, personalities, and other personal factors with regards to teachers was controlled to the extent that teacher A, who taught Beginning Shorthand at School X during 1964-65, also taught Beginning Shorthand at School X during 1965-66. The only major alteration was the installation of the 4-channel stenographic laboratories and the completion and distribution of a 440-tape library to each school. It is therefore reasonable to assume that any significant differences would be due primarily to the use of the stenographic laboratory and tape library.

All System shorthand teachers were asked to test the advanced shorthand students when they entered the class in the fall of 1964. The tests were 3- and 5-minute shorthand dictation tests transcribed with 95 per cent accuracy. At the end of the 1964-65 school year, all shorthand students in both the advanced and beginning classes were tested. Summaries of the results of these tests were made at each school and submitted along

with the names of each student enrolled in beginning and advanced shorthand. The same procedure and data were gathered for the 1965-66 school year.

In addition to the records of shorthand speed, a tabulation was made of scores on Test 3 (Correctness and Appropriateness of Expression--referred to as English Expression), Test 8 (General Vocabulary), and the composite of the Iowa Test of Educational Development (ITED).

Test data and shorthand achievement data for over 500 students each year are too voluminous to be recorded in this report. However, there are attached to the report the numbers of students included, test means, achievement means, and summaries of data in chart and table form from which the comments and conclusions will be drawn.

FINDINGS

Beginning Shorthand: The stenographic laboratory method of teaching Beginning Shorthand resulted in significantly better achievement than did the teaching of shorthand in the traditional way. The comparison of the achievement on 3- and 5-minute shorthand tests of the 1964-65 Beginning Shorthand students and the 1965-66 Beginning Shorthand students shows the difference of means was 4.8. The ratio of difference to sigma difference is 5.3 which shows that the difference between means is significant.

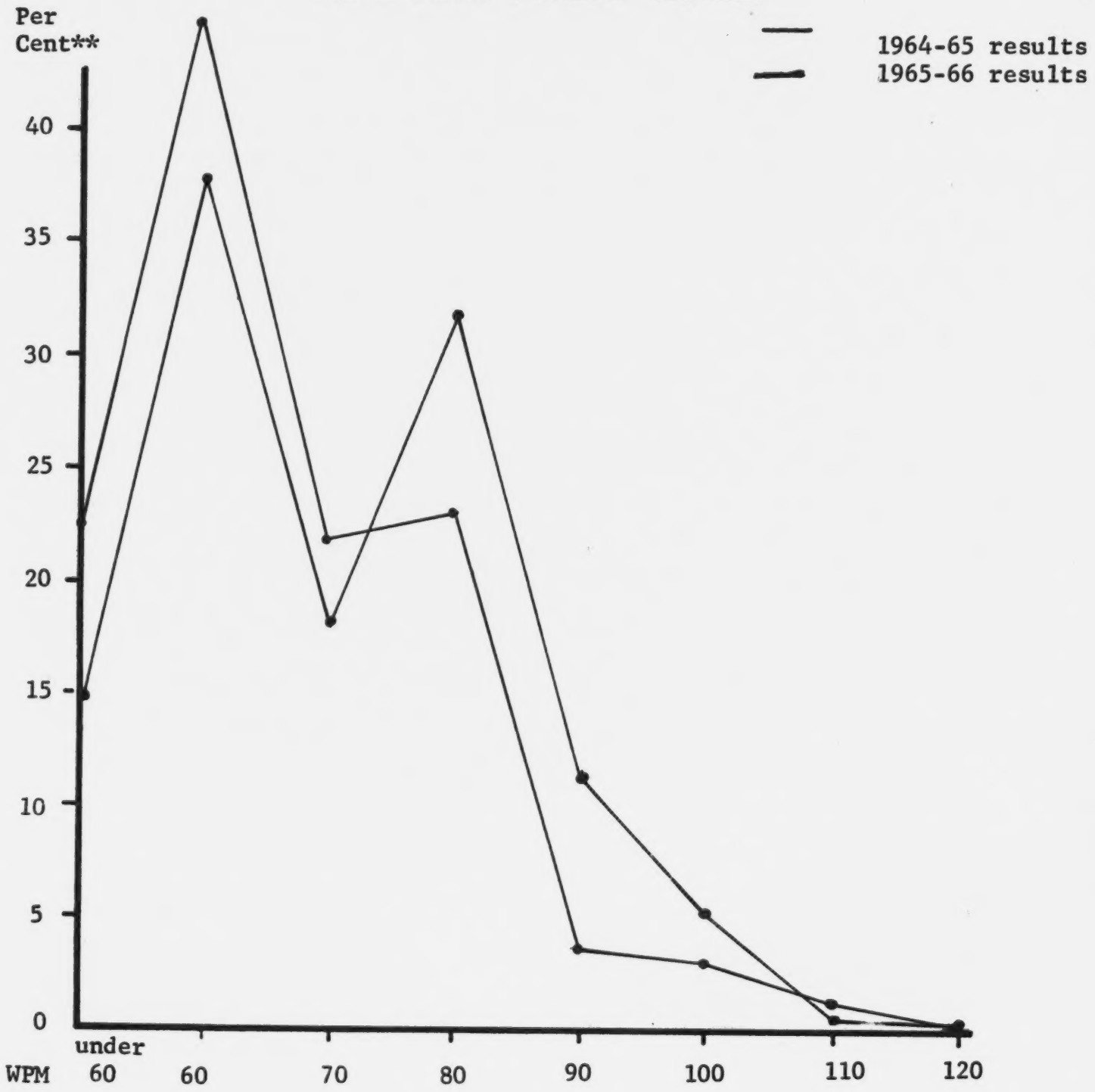
The figures show no significant difference in the drop out rate in the two years. From a beginning enrollment of 820 in 1964-65, 592 students or 72.2 per cent completed Beginning Shorthand. In 1965-66, 776 students enrolled in Beginning Shorthand and 556 or 71.6 per cent completed the course.

The summaries of the test scores in Table 1, Page 24 show that 18.8 per cent of the students completing Beginning Shorthand in 1964-65 had not attained a speed of at least 60 words per minute as compared to only 12.4 per cent in 1965-66 who had not attained at least 60 words per minute.

In 1964-65, 25.0 per cent had reached the speed of 80 words per minute or better while 40.8 per cent of the students in 1965-66 had reached at least 80 words per minute or better using the stenographic laboratory and tape library. At higher speeds, 3.0 per cent reached

100 words a minute or better in 1964-65, and in 1965-66, 5.4 per cent reached at least 100 words a minute. This is broken down in specific speeds in Illustration I below:

ILLUSTRATION I
ACHIEVEMENT ON 3- & 5-MINUTE TESTS*
FOR BEGINNING SHORTHAND STUDENTS



*The 3- & 5-minute test results were based on the student's transcript of a test on unfamiliar, unpreviewed material and transcribed with 95 per cent accuracy.

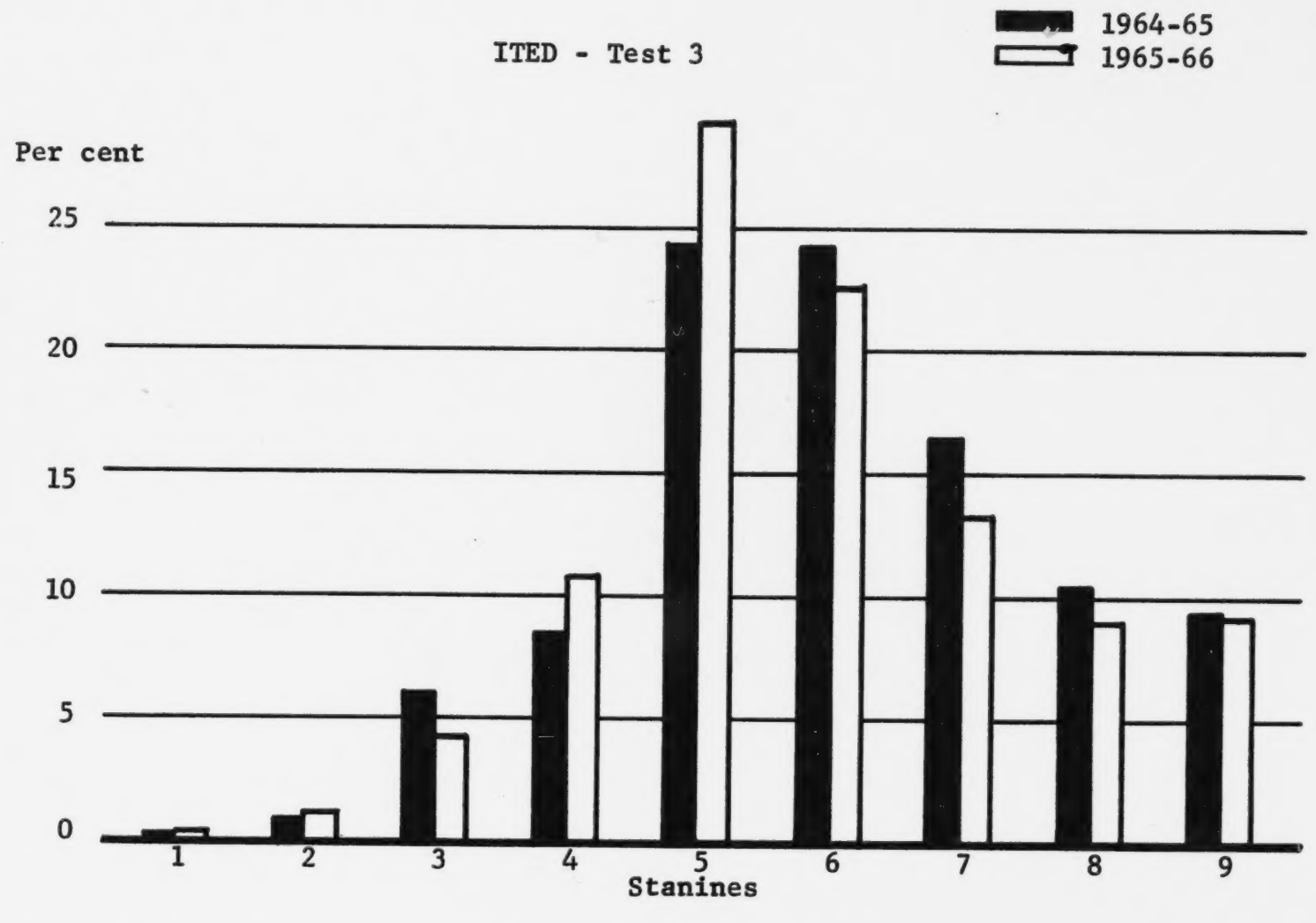
**Per cent of students attaining at least that speed but no more.

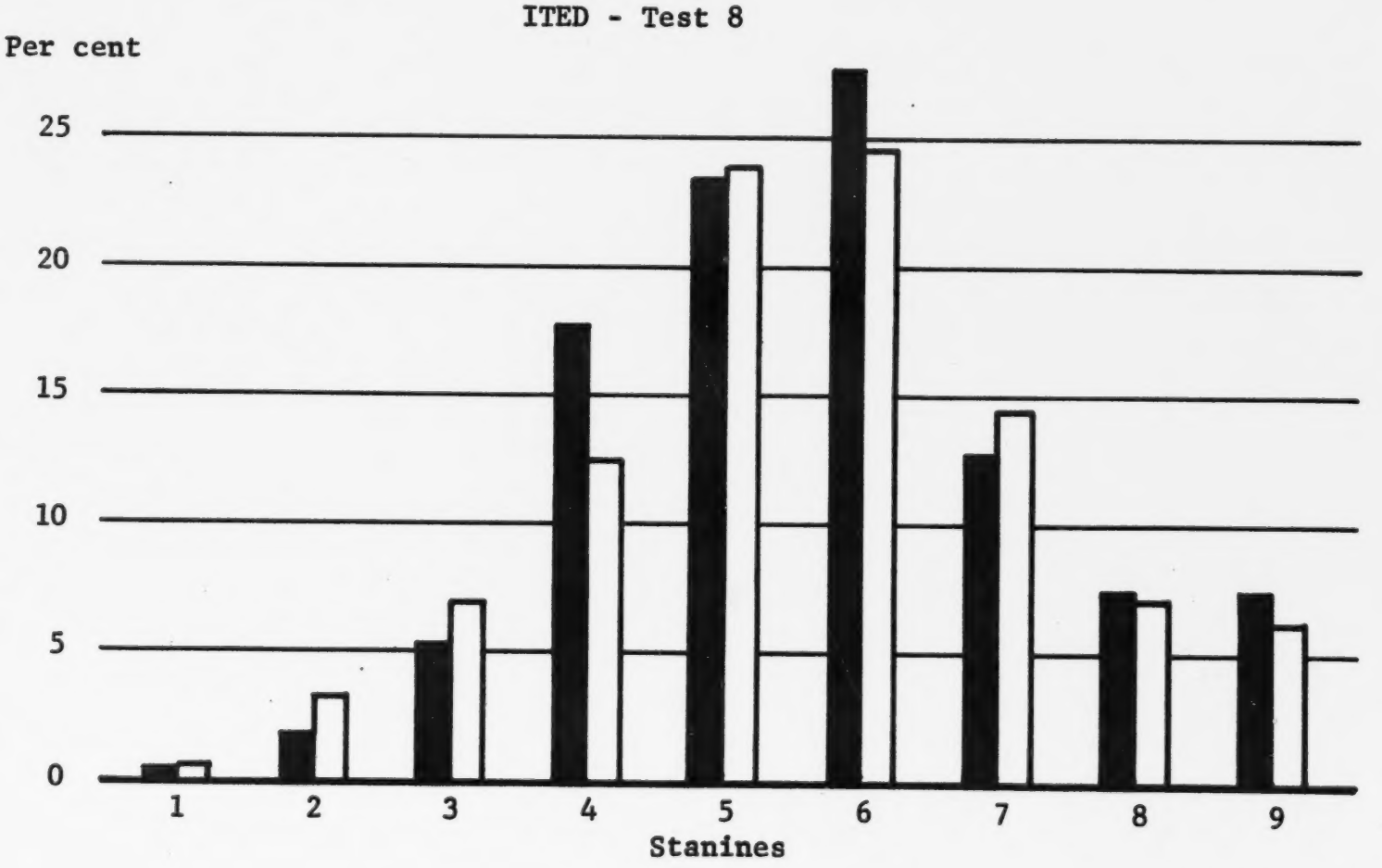
A comparison of ability of the two groups of students as indicated by the Iowa Test of Educational Development showed that the 1964-65 group of Beginning Shorthand students had a mean stanine of 6.0 on Test 3 (Correctness and Appropriateness of Expression) compared to a mean stanine of 5.9 for the 1965-66 group. On Test 8 (General Vocabulary) the 1964-65 group had a mean stanine of 5.7 and the 1965-66 group showed a mean stanine of 5.6. The Composite showed a mean stanine of 5.3 for 1964-65 and a mean of 5.2 for 1965-66.

The difference of means of the total of the scores on Test 3, Test 8, and the Composite for the two years had a ratio of the difference to the sigma of the difference of 1.5 which is not significant. Since each of the means of the scores on the Iowa Test of Educational Development for the 1964-65 group is higher than the corresponding means of the 1965-66 group, it is less likely to be erroneous to assume that the students in the 1964-65 group were more able than the students in the 1965-66 group than to assume that the students in the 1964-65 group were of the same ability as the students in the 1965-66 group. If the assumption is made that the 1964-65 group were more able than the students in the 1965-66 group, the achievement difference in shorthand speed would be even more pronounced.

The graph shown as Illustration II on page 10 shows the per cent of Beginning Shorthand students in 1964-65 at each stanine compared with the per cent of beginning shorthand students in 1965-66 at each stanine.

ILLUSTRATION II
GRAPHS SHOWING
PER CENT OF 1964-65 BEGINNING SHORTHAND STUDENTS
AT EACH STANINE COMPARED WITH 1965-66

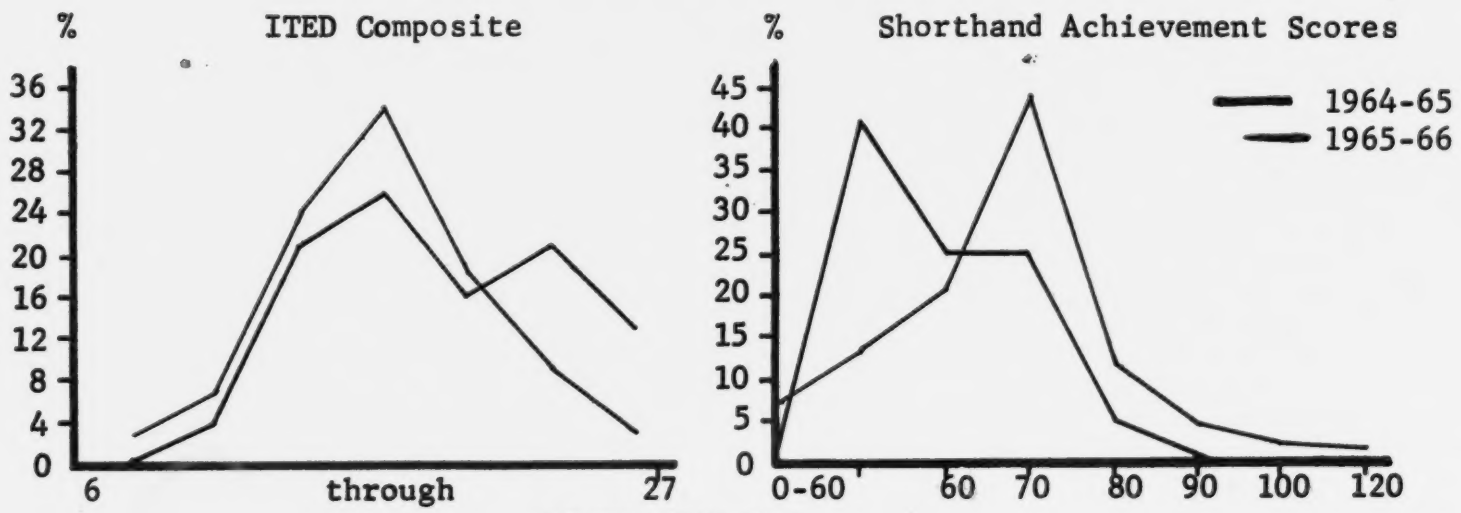




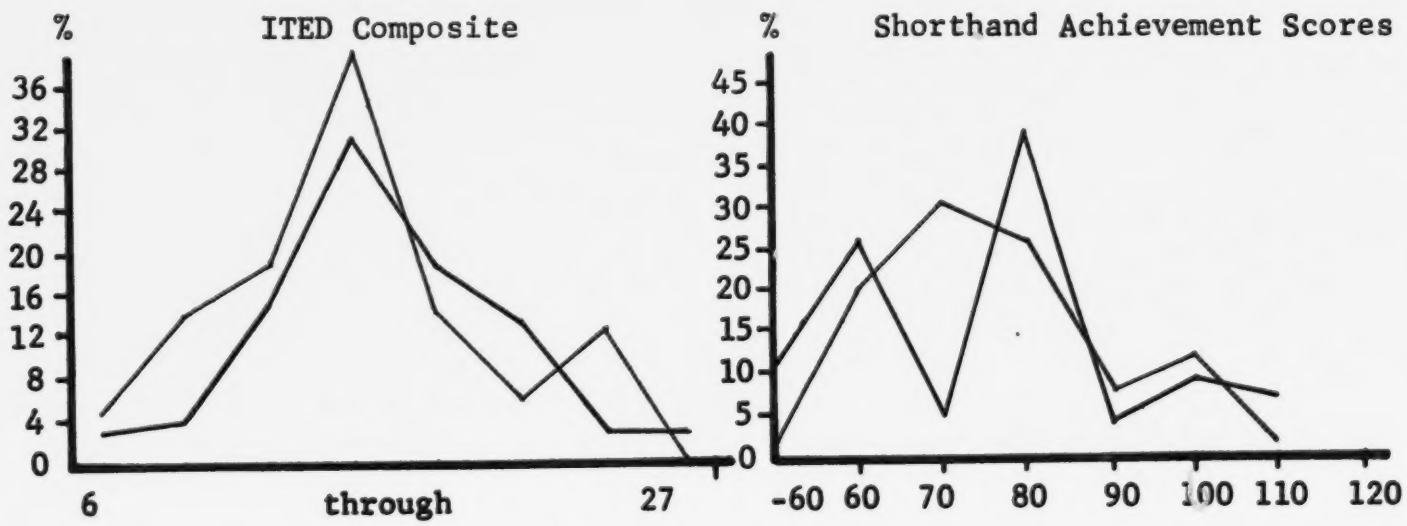
The test scores on the Iowa Test of Educational Development showed a significant difference in the ability of the students at Camelback and South Mountain. Camelback mean of the total of the three scores on ITED was 19.1 for students in Beginning Shorthand in 1964-65 and was 16.4 in 1965-66. South Mountain also showed a higher mean in 1964-65 (15.8) than in 1965-66 (13.3).

Shorthand students in both schools showed an increase in achievement in Beginning Shorthand. Camelback had a mean increase of 6.7 words a minute and South had a mean increase of .9 words per minute. When the difference in ability of the groups is taken into consideration, the increase is even more impressive than what is shown by the achievement differences in Appendix B, Table 1. Illustration III points this out.

CAMELBACK

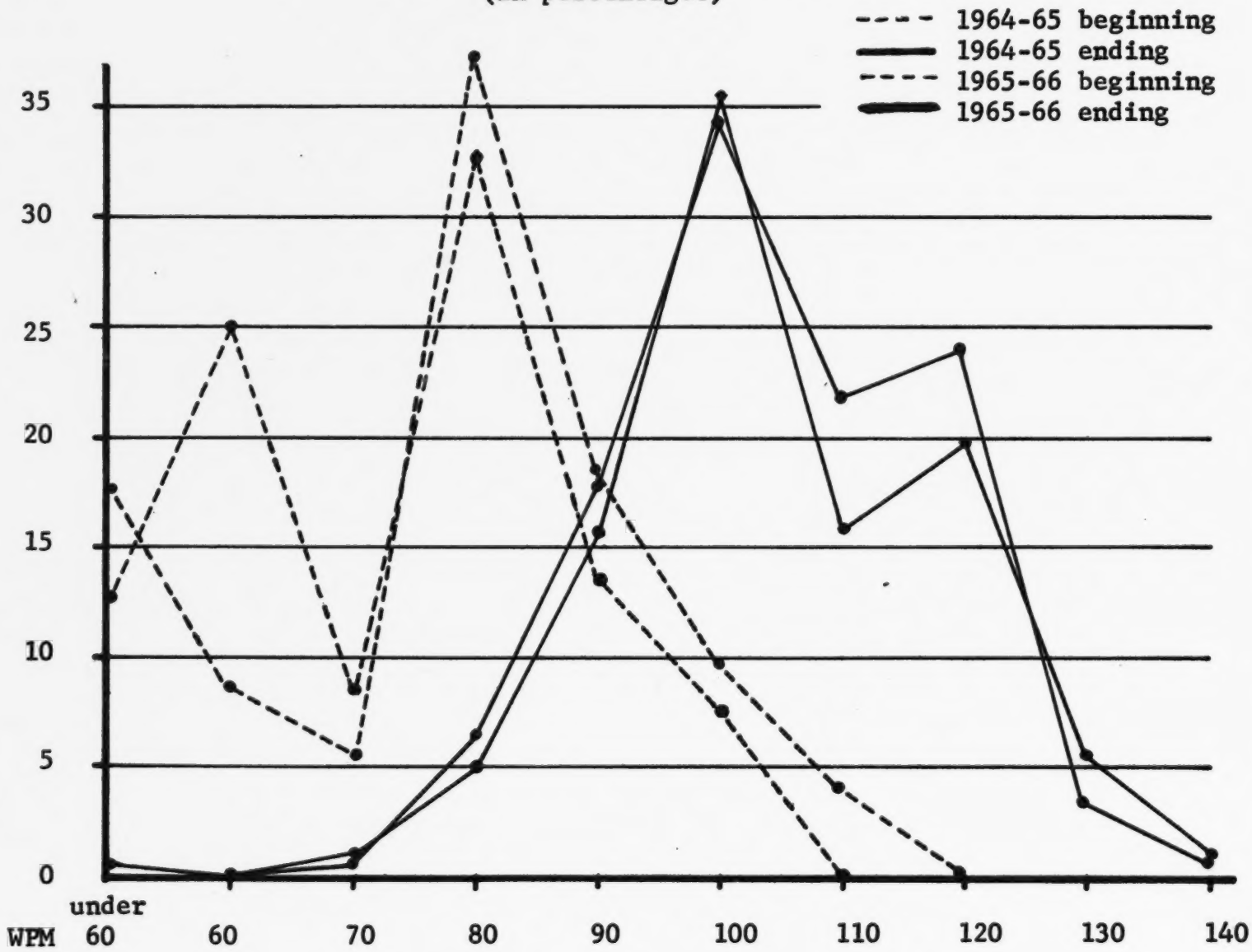


SOUTH MOUNTAIN



Advanced Shorthand: The stenographic-laboratory method of teaching Advanced Shorthand resulted in approximately the same shorthand speed achievement at the end of the year as did the traditional method. The comparison of the improvement on 3- and 5-minute shorthand speed tests for Advanced Shorthand showed no significant difference in improvement. See Illustration IV below.

ILLUSTRATION IV
BEGINNING & ENDING ACHIEVEMENT ON 3- & 5-MINUTE TESTS
FOR ADVANCED SHORTHAND STUDENTS
(in percentages)



For complete explanation of these terms see Illustration I, page 8.

Three schools showed greater increases in shorthand speed in Advanced Shorthand in 1964-65 than in 1965-66 or greater increase before the stenographic laboratories were installed. However, in all three cases, the starting speeds were considerably lower in 1964-65 than in 1965-66. The higher entry speeds in 1965-66 would indicate that the students were nearer their learning plateau or maximum levels at that time. North High School, which showed the greatest decline, had the highest starting speeds in 1965-66, 95.1, as compared with the System average of 73.2 in 1964-65 and 77.8 in 1965.66. The System totals show a difference in improvement of 0.2 words a minute. If North's figures are omitted from the totals because of the starting speeds being so near maximum, the difference in improvement is 9.0. A further breakdown of this information can be found in Appendix F, Table 5, Page 26.

The 1964-65 Advanced Shorthand students had a mean improvement of 26.8 words per minute; the 1965-66 Advanced Shorthand students had a mean improvement of 27.0 words a minute.

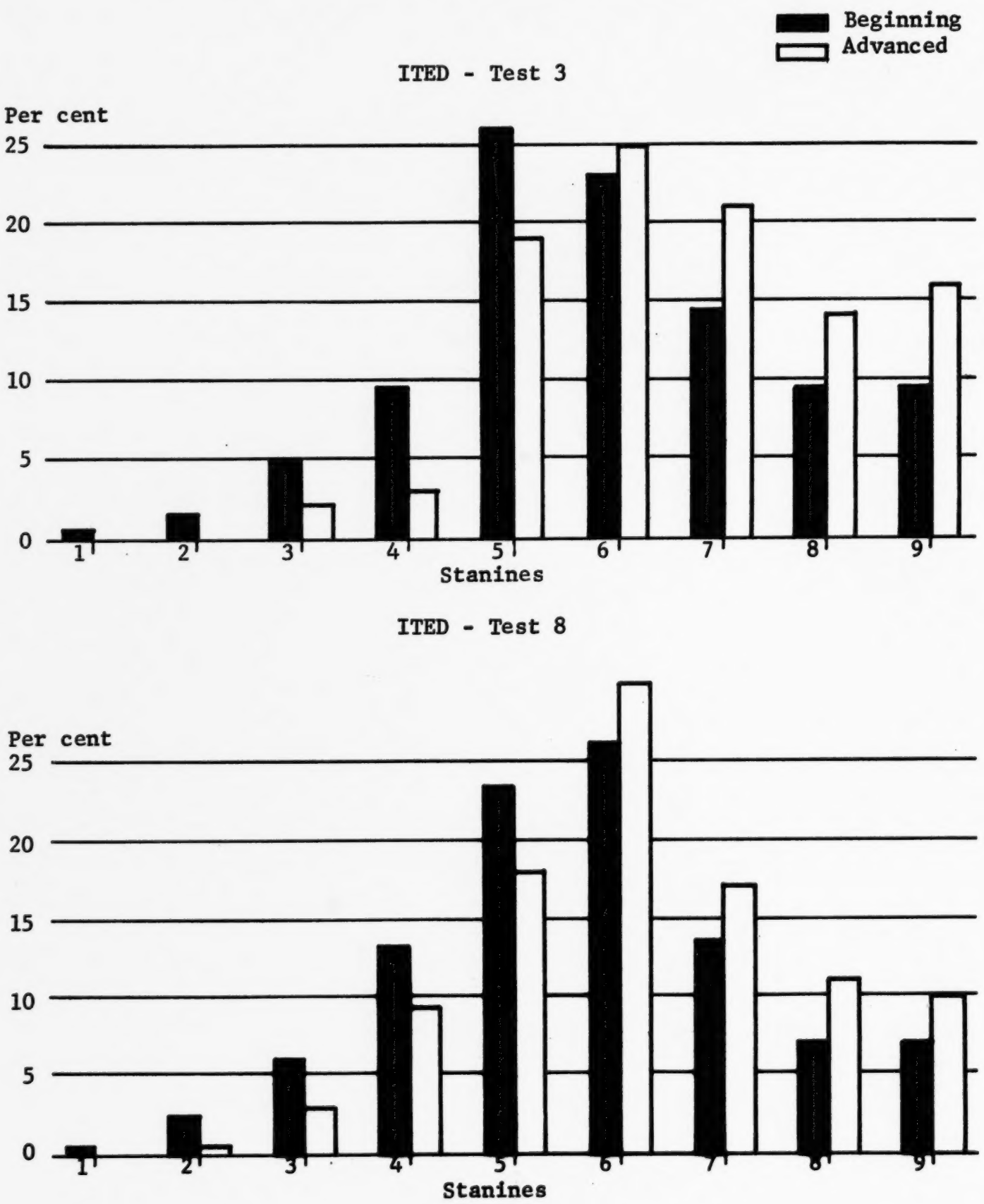
The comparison of Test 3 (Correctness and Appropriateness of Expression), Test 8 (General Vocabulary), and the composite of the Iowa Test of Educational Development indicated that like groups were measured. The mean of the three scores on the ITED indicated a difference of only .04 which is not significant.

An interesting picture developed from the means of the individual test scores. In 1964-65 the means of Test 3, Test 8, and the composite were 6.7, 6.3, and 5.6 respectfully. The same test means in 1965-66 were 7.1, 6.1, and 5.7. This would seem to indicate that those students entering Advanced Shorthand are more able in Correctness and Appropriateness

of Expression than in General Vocabulary; and are more able in General Vocabulary than in General Ability as measured by the composite on the Iowa Test of Educational Development.

Beginning and Advanced Shorthand: The combined means of Test 3 (Correctness and Appropriateness of Expression), Test 8 (General Vocabulary), and the composite for the students in Beginning Shorthand--1964-65, 17.1 and 1965-66, 16.8--and the combined means of Test 3, Test 8, and the composite for the students in Advanced Shorthand--1964-65, 18.5 and 1965-66, 18.5--would indicate that of those in Beginning Shorthand who do not continue in Advanced Shorthand, the greater percentage are students who score lower on the Correctness and Appropriateness of Expression, General Vocabulary, and have a lower composite score as measured by the Iowa Test of Educational Development. This is further illustrated by Illustration V, Page 15.

ILLUSTRATION V
GRAPHS SHOWING
PER CENT OF BEGINNING SHORTHAND STUDENTS IN 1964-65 & 1965-66 AT
EACH STANINE COMPARED WITH ADVANCED SHORTHAND STUDENTS



CONCLUSIONS AND IMPLICATIONS

Beginning Shorthand

1. Students in Beginning Shorthand attained significantly greater dictation speed when the 4-channel stenographic laboratory with the accompanying shorthand tape library was used than when Beginning Shorthand was taught without the use of the stenographic laboratory.
2. Students in Beginning Shorthand attained specific shorthand speed goals earlier in classes in which the laboratory and tapes were used than in classes in which they were not used.
3. More students in Beginning Shorthand attained acceptable speed goals by the end of the year when the stenographic laboratory and tapes were used than in classes in which they were not used.
4. More students in Beginning Shorthand attained an employable shorthand skill by the end of the school year in classes in which the stenographic laboratory and tapes were used than in classes in which they were not used.

Therefore, it would be reasonable to expect that:

a. Some students may reach their maximum shorthand speed in one year.
b. More Beginning Shorthand students are qualified to enter Advanced Shorthand.
c. The academic ability of the Advanced Shorthand classes may become lower.
d. If the academic ability becomes lower, more time may be needed for related secretarial duties in the Advanced Shorthand classes.

e. Some students could become effective secretaries and stenographers by taking Beginning Shorthand combined with secretarial training and transcription.

Advanced Shorthand

1. The students in Advanced Shorthand in this study who had had the Beginning Shorthand in the traditional way and Advanced Shorthand with the use of the stenographic laboratory and tapes made gains similar to Advanced Shorthand students who were taught the traditional way both years.
2. Advanced Shorthand students who received dictation via the stenographic laboratory and for whom dictation continues via the laboratory will attain an employable speed level earlier.

Therefore, it would be reasonable to expect that:

a. Teachers who use the stenographic laboratory and tapes have time for teaching students about other secretarial and office duties.
b. The teacher is freed from time and effort spent in preparation of dictation materials and actual dictation by use of the stenographic laboratory and tapes. The teacher, therefore, can devote time and attention to individualized instruction and to planning.
c. Individual speed building can be provided for those who need extra work in this area, while those who are near their maximum can be receiving instruction in other phases of secretarial work.

APPENDIX A — DEVELOPMENT OF THE TAPE LIBRARY

By the fall of 1964, the Phoenix Union High School System had installed stenographic laboratories in two of its ten high schools. It was apparent that stenographic laboratories with individual choice of dictation speed at each station made it possible for each student or the teacher to select the dictation speed that was best suited for each student. Through the use of the laboratory, class presentations became individualized with students switching from one speed to another according to their own skill and difficulty of the dictated material. It extended the dictation opportunities for the fast learners and gave added skill building practice for the slower students.

However, it was soon evident that very few commercial tapes were available for use in the stenographic laboratories. At South Mountain High School the equipment was put to use by using the four channels with the commercial tapes that were currently available to schools. This was found unsatisfactory for two major reasons:

1. There were not enough tapes. Therefore, the students became over-familiar with the material--memorizing in some cases, and in other cases becoming so tired of the dictator's voice and the material involved that there was no further gain by the use of the equipment.

2. When using the current material for speed building, each student or each group of students would be taking an entirely new or different set of material. This involved two things--either doing no previewing, or the teacher trying to preview for four groups.

With plans to install laboratories in the other eight schools by the fall of 1965, the System became concerned about the lack of tapes with which to make full use of the equipment.

A System-wide set of shorthand tapes was first proposed to the Business Education Department Chairmen in the ten high schools. This was followed by a proposal to the System shorthand teachers. It was pointed out that the heavy demand of classes, other duties, and individual help made it impossible for the shorthand teachers to prepare these tapes without help. The Advanced Shorthand teacher at South Mountain High School (one of the schools already equipped with the stenographic laboratory) proposed a list of 500 tapes needed for maximum, effective use of the stenographic laboratory. This proposal was based on the following premises:

1. In order to make the most effective use of the stenographic laboratory, the teacher must be free to help all of the students and in some cases dictate the fifth set of material.

2. There will be greater skill improvement and better integration of materials if all materials used during a specific period were directly correlated. For example, if the shorthand textbook had a chapter on home improvements, then the speed practice, transcription material, and test material should be on home improvements so the students will be using the same vocabulary for all types of material.

This proposal for a 500-tape library was presented by the Business Education Consultant to the Assistant Superintendent for Instruction in February 1965.

The first proposal asked for an eight week, Saturday morning, inservice workshop to prepare dictation tapes for the System stenographic laboratories at South Mountain and North high schools and to form the nucleus of a System shorthand tape library to be used in all ten schools. It was suggested that one shorthand teacher from each high school participate along with an Audio-Visual director and the System Business Education Consultant.

A proposal was made to the State Department of Vocational Education that the State provide 50 per cent support for the building of all tapes to be used in the Vocational Advanced Shorthand classes.

The following was completed prior to the first Saturday morning session:

1. Arrangements had been made with publishers for use of their materials. Special arrangements were made with Gregg Publishing Company for the use of their materials for Beginning Shorthand.

2. Participants of the workshop met twice for special instructions and study sessions.

3. Voices were tested on tape and evaluated for tonal quality and ease of understanding by shorthand students.

4. The Audio-Visual director made a presentation on how tapes worked, how to operate a machine and how to splice the tape to the group which planned to meet for the Saturday workshops.

5. The assignments for the first session were made and distributed.

6. Materials had been gathered from businessmen.

The cooperation of a great many business leaders in the community was secured. These businessmen opened their files and submitted actual business materials to be dictated. A form was sent out to these people on which they were to signify whether they wanted the materials back, whether they wanted the names of the recipients of the letters changed, or whether they wanted company names changed. In all cases their wishes were adhered to. The Administrative Management Society of Phoenix took as one of its educational projects for the year the task of helping to secure these materials for the tape library. The Phoenix Personnel Management Association and the Arizona Business Education Council gave their full support in obtaining business letters. The quality of the material received was good and for the most part, it was more than satisfactory in wording and content. This material was the kind the student would be working with in the future and therefore was more appropriate than most textbook materials.

During the eight Saturday morning sessions, approximately 50 per cent of the time was spent on taping. The other 50 per cent of the time was spent in programing, previewing, and making keys. The production rate during these sessions was low because of adjustments to the machines, corrections and retaping, and adjustment to the programing. A total of 30 tapes were completed with 15 in progress.

At the end of the eight Saturday morning sessions, the tapes were evaluated. The evaluation showed that the tapes were satisfactory. A proposal was made to continue building the tape library in a 3-week summer workshop. The goal of the summer workshop was the completion of the 500-tape library.

A goal was set of 30 tapes a day. The goal was reached during the last half of the workshop. During this time, the A.V. Director was attaching leaders and splicing before the tape was dictated. Six or seven recording stations were in operation at all times. One person was occupied with making keys for the shorthand previews and one person arranging materials for the tapes. The people who taped the material did previews, programing, and counting when they were not involved in the actual taping of the materials. All new materials were counted, indexed, and previewed prior to taping. Some teachers averaged recording five tapes per day--however, this was not possible for all the teachers because of voice problems and material difficulty.

At the end of eight Saturday mornings and fifteen days during the summer, 440 thirty minute tapes had been completed on two tracks. This amounted to a total of 440 hours of dictation, and covered approximately 30 subjects as follows:

	Number of Tapes
Speed building - consists of five tapes per set (a set consists of the same material on each tape, dictated at different speeds by one person) speeds from 60 - 140.	
15 minute practices using minute step speed building plan ending with 3 minute take--22 sets	110
30 minute practices using minute step speed building plan ending with 5 minute take--28 sets	140
Progressive speed letters 60-120	3
Office Style dictation	15
Tests (3 and 5 minute takes) 60-120	18
Transcription letters (Taken from South-Western books) 60-120 . . .	33

Beginning Shorthand, semester 1 (Taken from Gregg Shorthand)

5 sets with 1 tape per set	5
5 sets with 2 tapes per set	10
6 sets with 3 tapes per set	18

Beginning Shorthand, semester 2 (Taken from Gregg Dictation)

16 sets with 4 tapes per set	64
4 sets of brief form letters with 6 tapes per set	24

The authors spent two additional weeks working on keys, coding, and general preparation for the printing of the two-volume teacher's key to accompany the tapes.

The first volume of the teacher's key was distributed at the same time the tapes were distributed. The second volume was ready in March of 1966.

Marking of the leaders on the tapes and labeling the boxes were left to the individual school. Each box of tape carried a code to identify the contents.

A review of tape and stenographic laboratory usage was given for all Shorthand teachers at the March 1966 Improvement of Instruction Day. During the summer of 1966 an operations manual was completed on the use of the laboratory equipment. These last steps were taken to encourage better usage of the equipment in the future.

APPENDIX B TABLE 1 BEGINNING SHORTHAND SPEED ACHIEVEMENTS

School	Total Numbers Beg-End	Under 60	60	70	80	90	100	110	120
Alhambra									
64-65	109- 81	12	53	7	9	0	0	0	0
65-66	126- 89	12	53	0	20	0	4	0	0
Camelback									
64-65	92- 92	2	38	23	23	5	1	0	0
65-66	108-108	8	14	21	46	12	4	2	1
Central									
64-65	103- 73	32	8	16	8	8	1	0	0
65-66	101- 69	15	10	13	15	13	3	0	0
East									
64-65	30- 28	20	7	0	1	0	0	0	0
65-66	74- 46	10	16	8	7	5	0	0	0
Hayden									
64-65*									
65-66	60- 46	0	8	20	12	4	2	0	0
Maryvale									
64-65	153-120	17	49	32	20	2	0	0	0
65-66	115- 88	12	24	11	29	7	4	0	1
North									
64-65	144- 88	20	19	22	20	0	7	0	0
65-66	120- 71	3	40	4	10	10	4	0	0
South									
64-65	85- 57	6	15	3	22	2	5	4	0
65-66	82- 50	1	10	15	13	4	6	1	0
Union									
64-65	104- 53	7	32	4	10	0	0	0	0
65-66	50- 35	8	9	12	5	1	0	0	0
West									
64-65*									
65-66	74- 74	35	19	17	2	1	0	0	0
Totals									
64-65	820-592	116	221	107	113	17	14	4	0
65-66	910-682	104	203	121	159	57	27	3	2

*Data was incomplete for that year.

School	Test 3, 8, & Composite of ITED 1964-65 No.	Mean	1965-66 No.	Mean	Net Change	Shorthand Achievement 1964-65 No.	Mean	1965-66 No.	Mean	Net Change
Alhambra	97	17.1	85	17.7	+ .6	81	61.6	89	69.0	+ 7.4
Camelback	76	19.1	71	16.6	- 2.5	92	69.3	108	76.0	+ 6.7
Central	65	19.8	59	19.8	---	73	63.8	69	71.4	+ 7.6
East	26	16.4	38	17.4	+ 1.0	28	53.6	46	65.9	+12.3
Hayden*			46	15.5	---			46	73.9	---
Maryvale	89	16.2	46	17.5	+ 1.3	120	65.1	88	71.4	+ 6.3
North	68	18.2	70	17.1	- 1.1	88	68.0	71	67.5	- .5
South	68	15.8	64	13.4	- 2.4	57	75.3	50	76.2	+ .9
Union	83	14.1	54	13.5	- .6	53	63.2	35	64.9	+ 1.7
West*			62	18.3	---			74	58.5	---
Totals	551	17.1	595	16.8	- .3	592	65.8	556	70.6	+ 4.8
Totals omitting Ca. & S.	407	17.0	454	17.3	+ .3	443	63.9	398	67.7	+ 3.8

*Data for Hayden and West are not included in the totals because the data for both years were not complete.

APPENDIX D TABLE 3 ADVANCED SHORTHAND SPEED ACHIEVEMENTS

School	Total Number	Under 80	80	90	100	110	120	130	140
Alhambra									
64-65	35	0	6	9	12	5	1	2	0
65-66	29	0	0	7	14	5	2	1	0
Camelback									
64-65	46	0	0	4	30	7	4	1	0
65-66	21	0	0	0	14	4	3	0	0
Central									
64-65	17	0	0	5	4	3	5	0	0
65-66	27	1	7	10	6	1	2	0	0
East									
64-65*									
65-66	12	0	0	2	2	4	3	0	1
Hayden									
64-65**									
65-66	15	0	0	2	6	5	2	0	0
Maryvale									
64-65	42	3	0	3	9	11	13	2	1
65-66	19	0	0	3	6	2	6	2	0
North									
64-65	28	0	0	0	10	1	14	2	1
65-66	19	0	0	0	0	0	19	0	0
South									
64-65	19	0	1	1	6	4	3	4	0
65-66	22	0	2	0	11	3	3	2	1
Union									
64-65	15	0	3	10	1	1	0	0	0
65-66	15	0	1	7	1	3	3	0	0
West**									
Totals									
64-65	202/236+	3	10	32	72	32	40	11	2
65-66	210/269+	1	10	31	60	27	43	5	2

*Course not offered
**Data incomplete
+Number starting course

APPENDIX E TABLE 4 ADVANCED SHORTHAND

STARTING SPEEDS

School	Total Number	Under 60	60	70	80	90	100	110	120
Alhambra									
64-65	41	0	7	5	26	0	3	0	0
65-66	33	1	3	0	25	4	0	0	0
Camelback									
64-65	50	0	0	4	25	17	4	0	0
65-66	25	0	0	4	13	6	1	1	0
Central									
64-65	22	0	6	5	11	0	0	0	0
65-66	27	18	5	3	1	0	0	0	0
East									
64-65*									
65-66	24	15	6	2	1	0	0	0	0
Hayden									
64-65**									
65-66	16	0	0	8	8	0	0	0	0
Maryvale									
64-65	45	1	14	0	11	9	10	0	0
65-66	27	1	3	6	15	1	1	0	0
North									
64-65	32	6	19	1	4	2	1	0	0
65-66	35	0	0	0	2	18	10	5	0
South									
64-65	21	0	12	4	0	5	0	0	0
65-66	25	1	0	1	13	3	5	2	0
Union									
64-65	25	23	1	1	0	0	0	0	0
65-66	25	12	3	2	4	2	2	0	0
West**									
Totals									
64-65	236/202+	30	59	20	77	32	18	0	0
65-66	269/210+	51	25	38	88	38	20	8	0

*Course not offered
**Data incomplete
+Number completing course

APPENDIX F TABLE 5

SUMMARY OF MEANS - ADVANCED SHORTHAND

School	Test 3, 8, & Composite of ITED 1964-65 No.	Mean	1965-66 No.	Mean	Net Change	Starting Speed 1964-65 No.	Mean	1965-66 No.	Mean	Ending Speed 1964-65 No.	Mean	1965-66 No.	Mean	Speed Improvement 64-65	65-66	Net Change
Alhambra	34	19.2	31	19.8	+ .6	41	76.8	33	78.5	35	97.7	29	101.7	20.9	23.2	+ 2.3
Camelback	42	18.8	33	20.0	+1.2	50	84.2	25	82.8	46	103.0	21	104.8	18.8	22.0	+ 3.2
Central	21	18.9	26	18.8	- .1	22	72.3	27	57.3	17	104.7	27	91.5	32.4	34.2	+ 1.8
East			9	19.0	--			24	55.4			12	110.0		54.6	--
Hayden			14	14.6	--			16	75.0			15	104.7		29.7	--
Maryvale	57	18.8	15	18.0	- .8	45	79.6	27	72.6	42	107.9	19	108.9	28.3	36.3	+ 8.0
North	62	17.0	19	19.6	+2.6	32	63.1	35	95.1	28	118.2	19	120.0	55.1	24.9	-30.3
South	21	17.7	24	17.9	+ .2	21	69.0	25	78.0	19	110.0	22	100.9	41.0	22.9	-18.1
Union	25	17.5	24	14.1	-3.4	25	51.2	25	64.8	15	90.0	15	100.0	38.8	35.2	- 3.6
West			28	18.8	--			32	73.4							
Totals*	262	18.5	223	18.5	.0	236	73.2	202	77.8	202	100.0	152	104.8	26.8	27.0	+ .2

*Data for East, Hayden, and West are not included in the totals because the data for both years were not complete.